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PROCEEDINGS OF THE SCIENTIFIC ASSOCIATION OF THE JOHNS HOPKINS UNIVERSITY.

One Hundred and Twenty-eighth Regular Meeting, November 19, 1896.

The President of the Association, Professor Remsen, in the Chair.

The following paper was presented and read :

Experiments with the Polarizing Photo-Chronograph on the Motion of Projectiles. By GEORGE O. SQUIER.

This paper presented a resumé of the experiments conducted at the U. S. Artillery School,¹ Fort Monroe, Va., in developing this new instrument, and its applications to the study of exterior and interior velocities of projectiles in cannon, as well as its use thus far in purely physical research.

The essential principle of this chronograph whereby, it is thought, that a distinct advance is made in the reliable measurement of minute intervals of time, is the realization of a means of permanently recording upon a moving photographic plate the occurrence of a distant phenomenon as nearly simultaneously with the existence of the phenomenon itself as possible. This is accomplished by substituting for the *material mechanism*, such as a stylus, armature, &c., which have heretofore been employed in making the record under the control of an electric current, and which necessarily possess a certain amount of inertia,—an *etherial mechanism* without mass, so that in the complete operation of transmitting and producing a permanent record, no *ponderable matter* is required to be moved.

The *massless* recorder is a beam of polarized light, whose plane of polarization is caused to rotate under the control of an electric current in a solenoid placed in the path of the beam, and enclosing a glass tube containing liquid carbon bisulphide or other suitable material, as in Faraday's discovery. The essential apparatus consists of a source of light, a polarizer, a solenoid and tube, an analyzer, and a moving photographic plate. If then the phenomenon to be recorded is made to change an electric current in a line wire connected to the tube solenoid, and the polarizer and analyzer are "crossed" when no current is flowing,—whenever the current is made, light reaches the photographic plate, due to the rotation of the plane of polarization, and whenever the current is broken, the light is cut off sharply as though a photographic shutter were interposed; in fact we have in this simple arrangement a *massless shutter* in practically accurate phase with the distant phenomenon itself and also a permanent record of the occurrence of the same.

The great delicacy and reliability of this instrument, has permitted the direct dynamic study of the motion of projectiles inside the bore of a gun, where as many as seven observations upon a projectile have been taken within a distance of 57 cms. These experiments involved dealing with a unit of time, which bears about the same relation to a second as a second does to a third of an hour. In the field of exterior ballistics, it has been experimentally shown for the first time, that the velocity of a projectile is

not a maximum at the muzzle of the gun but at a point a considerable distance in front of the muzzle.

It is as an apparatus for physical research that this new instrument is expected to prove of great value, and open up a range of experiment hitherto closed.

Some experiments have already been made with it in the study of electric currents at the "make" for an harmonic electromotive force, and verifications of theory have been obtained.

The general expression for the instantaneous value of the current is

$$i = \frac{E}{\sqrt{R^2 + \left(\frac{1}{C\omega} - L\omega\right)^2}} \sin \left\{ \omega t + \arctan \left(\frac{1}{RC\omega} - \frac{L\omega}{R} \right) \right\} + C_1 e^{-\frac{t}{T_1}} + C_2 e^{-\frac{t}{T_2}}$$

in which C_1 and C_2 are arbitrary constants, and T_1 and T_2 are the time-constants of the circuit.

The effect of the exponential terms above upon the current during the very few oscillations after the "make" for circuits of varying conditions as to resistance, inductance, and capacity, and for variations in the phase of the "make," may be easily studied owing to the quickness of this instrument.

In the biological, physiological, and psychological laboratory, this instrument should prove of value where other forms of instruments have heretofore been used; and it is desired, in the interests of science, to have this new apparatus in the hands of those having facilities for its use in these and other fields of research.

One Hundred and Twenty-ninth Regular Meeting, December 17, 1896.

The President of the Association in the Chair.

The papers presented and read were :

1. Recent Researches on Metallic Carbides and Allied Compounds. By EDWARD RENOUF.

The recent application of the electric arc as a means of obtaining very high temperatures has stimulated research on metallic compounds formed at high heat and unstable in contact with water, hence not found in nature. We owe knowledge of the carbides or compounds of metals with carbon, principally to Moissan. Most metallic carbides are made by heating oxides with carbon at temperatures varying from 3500° to 5000°. They are metallic substitution products of hydrocarbons, and as a rule yield hydrocarbon and metallic hydroxide in contact with water. Some are acetylides yielding pure acetylene, as is the well-known calcium carbide used for the technical preparation of acetylene. Aluminium and beryllium carbides are methides

¹ In Press, "The Polarizing Photo-Chronograph," Cleghorn and Squier. John Wiley & Sons, New York; Chapman & Hall, London.

yielding pure methane. Many other carbides, notably those of uranium and iron yield complex mixtures of saturated and unsaturated, gaseous, liquid, and solid hydrocarbons. Moissan thinks that natural gas and petroleum are formed by action of water on carbides contained in the earth's crust. Considering the evidence, this is the most acceptable solution of the problem of the formation of petroleum and natural gas yet offered. Metallic nitrides, compounds of metals with nitrogen, are mostly made by contact of nitrogen with metals at high temperatures; some by the action of ammonia on metals at high temperatures, when hydrogen escapes and the metallic nitrides are formed. They are decomposed by water into ammonia and metallic hydroxides, hence must be regarded as substituted ammonias.

Metallic silicides, compounds of metals with silicon, are formed by heating metals with silicon, and yield, on treatment with water, metallic hydroxides and silicon hydride. Metallic borides are made in the same way and behave similarly with water, excepting that boron hydride is itself decomposed by water forming boric acid.

The metallic hydrides, or compounds of metals with hydrogen, are but little known. The hydride of lithium has been carefully studied by Guntz, the hydrides of calcium, strontium, and barium, and of some rarer metals, by Winkler. The hydrides are all stable at very high temperatures, but are decomposed violently by water, yielding metallic hydroxides and hydrogen.

Spectrum analysis proves the existence of hydrogen, carbon, and many metals, in the stars and in the atmosphere of the sun, at temperatures too high for water, ammonia, and most metal oxides to exist. It is highly probable that the metals exist in the heavenly bodies at the present time, and formerly existed on the earth when the earth was hot enough, in combination with the elements mentioned above. A study of the decomposition of these compounds with water and with air, throws light on the chemical changes and rearrangements occurring on the cooling of a world; for example, metallic hydrides cooled to a sufficient temperature in presence of oxygen, take fire and burn, forming metallic oxides and water vapor; the oxides form hydroxides with the water. Carbides are broken down by the water into hydroxides and hydrocarbons. The hydrocarbons burn in oxygen to form water and carbonic acid, which last combines with the hydroxides to form water and metallic carbonates. The ammonia necessary for the beginnings of plant life could be furnished by action of water on the nitrides. The formation of silicates and borates would necessarily occur in the same way as that of the carbonates. Thus we can by laboratory study form a clear picture of the genesis of the metallic compounds now existing on the earth.

2. A recently discovered Property of the Blood Serum in Animals immune from Certain Diseases, and its Application to the Diagnosis of the Diseases in Human Beings. By SIMON FLEXNER.

A significant advance has just been made in regard to the diagnosis of typhoid fever. The basis of this advance is the so-called cholera reaction of Pfeiffer, which, it may be recalled, was introduced for the purpose of discriminating between the vibrio of Asiatic Cholera and certain allied bacterial forms. Pfeiffer found that the blood-serum of an animal rendered immune from the cholera germ, would, if mixed with a pure culture of this germ and introduced into the peritoneal cavity of a guinea pig, cause a rapid dissolution of the micro-organisms, while no effect was exerted upon other, although closely allied species. The same reaction can be obtained with various other bacterial forms, such as the diphtheria bacillus, typhoid bacillus, colon bacillus, etc., provided the serum of animals immune from these organisms be substituted for the cholera serum. Thus it was shown that the action of the immunized sera is specific for a particular kind of bacterial protoplasm. The changes which are induced in animals by exposing them to experimental infection with the bacteria mentioned, take place, in a similar manner, in human beings who suffer from the diseases caused by these micro-organisms. In the course of typhoid fever, cholera and diphtheria, immunizing substances, before absent, now appear in the blood and other fluids of the body.

It seems very natural to reverse the order of applying the reaction mentioned, and instead of using a specific immunized blood-serum to detect a particular kind of bacterium, to employ a specific micro-organism in order to discover the presence of the immunizing substances. Proceeding upon this idea, Widal, and after him Grünbaum, suggested that in doubtful cases of typhoid fever the blood of the patient might be utilized for the purposes

of diagnosis. The methods of making the tests are simple and readily carried out. Widal recommends adding to a bouillon culture of the bacillus typhosus about one-tenth of its volume of the blood-serum from the suspicious case. If it is one of typhoid fever, the bacteria soon begin to run together, form clumps, and gradually sink to the bottom of the test tube in the form of a sediment. A slight modification of this method consists in using a mixture of blood-serum in the proportions mentioned, which is inoculated with typhoid bacilli from a pure culture. The growth of the bacilli, instead of taking place in a diffuse manner throughout the fluid, is in the form of clumps, which fall to the bottom of the tube. In its simplest form, the reaction may be obtained from a drop of blood taken from the finger-tip or lobule of the ear, which has been allowed to dry upon a glass slide. The dried blood is moistened with a drop or two of water in order to cause a solution of the serum, and a small amount of this serum is added to a drop of a living culture of the typhoid bacillus. If this mixture is now observed under the microscope the bacilli are seen to quickly lose their motility and in a short while (within 30 minutes) to run together to form clumps, or as these have been called, "agglutinates." This reaction has been obtained as early as the third or fourth day of the disease and as late as the ninetieth, and promises to be fairly constant. It may persist for a considerable period—limit unknown—after recovery, the blood of persons still showing the reaction two years after the disease. As far as we are informed at present, the reaction is to be relied upon as diagnostic. It has grown out of the Pfeiffer cholera reaction; but it differs from this in dispensing with an animal for the experiment, and, also, because in it the bacteria do not proceed to disintegration but merely to agglutination.

The papers presented and read by title were:

1. On Singularities of Single-Valued and generally Analytic Functions. By A. S. CHESIN.
2. On the Analytic Theory of Circular Functions. By A. S. CHESIN.

One Hundred and Thirtieth Regular Meeting, January 21, 1897.

The Vice-president of the Association, Professor Howell, in the Chair.

The papers presented and read were:

1. The Stratification of Glaciers and the Origin of some Moraines. By HARRY FIELDING REID.

Observations were begun last summer to determine the actual direction of the motion of the ice of the Forno glacier in Switzerland. They will be completed next summer. The vertical as well as the horizontal components of the motion in different parts of the glacier will be determined. This is to test a theory published in the *Journal of Geology*, Vol. IV, p. 913, in which it is shown that the vertical component of the movement should be downward above the névé-line, and upward below it. If this be true, then material dropped from the cliffs in the reservoir of the glacier, should disappear and emerge again at the surface below the névé-line. Such moraines were found, and were seen to be intimately connected with the stratification. All the observations on the Forno glacier indicate that, what Forbes called the "ribboned structure," is, as Agassiz contended, the outcrop of the strata. The very bad weather last summer interfered so much with the work that this conclusion could not be finally confirmed or disproved.

2. Some Recent Advances in Spectrum Analysis. By JOSEPH S. AMES.

Attention was called to the fact that the supposed discovery of oxygen in the sun was disproved by observations of Mr. Jewell; that as yet there was no spectroscopic evidence of the presence of two elementary gases in Clèveite gas; that for the formula connecting lines in the series so often observed in spectra Balmer has recently suggested $\frac{1}{\lambda} = a - \frac{b}{n^2 + c}$ where $n = 3, 4, 5$, etc.; that series of this kind have been discovered in the spectrum of oxygen; that a most important mathematical relation has been found to exist between the series observed in the spectrum of any one element. The importance of the study of these series with reference to molecular theories was touched upon.

NOTES FROM THE GEOLOGICAL LABORATORY.

THE GEOLOGY OF THE SAND HILLS OF NEW JERSEY.

BY WM. B. CLARK AND GEO. B. SHATTUCK.

The Sand Hills constitute a part of an isolated area of high land in Middlesex County, New Jersey, known as Ten Mile Run Mountain, the eastern end of which is about two miles to the north of Monmouth Junction upon the Pennsylvania Railroad. The Sand Hills proper rise to a height of 293 feet, although an elevation of 321 feet is reached by the mountain about three miles to the westward at a point overlooking the valley of Millstone River. The Ten Mile Run Mountain slopes rapidly in nearly all directions, so that the region stands out prominently in the landscape when viewed from any direction.

The Sand Hills district has been often mentioned in geological literature, and its isolated capping of clays, gravels and sands has been the subject of frequent discussions, in which wide differences of opinion are found regarding the interpretation of the overlying gravels and sands.

An early reference to the area is found in the final report of Professor H. D. Rogers, upon "The Geology of New Jersey," printed in 1840, in which the "shales" and "trap rock" underlying the Sand Hills region are referred to and represented upon the geological map of New Jersey which accompanies the volume. The clays and sands were evidently not recognized.

Professor George H. Cook made frequent reference to the Sand Hills region in his various reports. In his "Geology of New Jersey," published in 1868, he mentions the area several times and recognizes the "Triassic shales" and "trap" as forming the base of the high land, but regards the overlying gravel and sand as "drift." He states that the occurrence of the latter is similar to that in many other localities in New Jersey, and is "found deposited behind some protecting ridge of rock just as would happen in a stream now."¹ In his report on the "Clay Deposits of New Jersey," published in 1878, Professor Cook refers at length to the clay deposits overlying the shales and trap rock, and regards them as equivalent to the "Raritan clay bed" to the east. In explanation of its occurrence he says that "the trap rock and shale surround this clay holding it in a basin-like depression. The eastern and southern connections with the same bed, as seen elsewhere, have been removed, and in this manner this mass or pocket has been left isolated and closed in by these trap rock ridges and the great pile of drift of the Sand Hills." In the annual reports of the State Geologist for 1880 and 1882, Professor Cook again mentions the Sand Hills area, but offers no further explanation regarding the age of the materials overlying the Jura-Trias.

Mr. W. J. McGee, in his article upon "Three Formations of the Middle Atlantic Slope," in speaking of the Potomac formation, says: "and the still more doubtfully identified outlier forming the 'Sand Hills' area near the Raritan, rests upon an apparently eroded Triassic trap dyke."²

In his discussion of "The Relations of the Traps of the Newark System in the New Jersey Region," Mr. N. H. Darton discusses the Ten Mile Run Mountain area and gives a map in which the intrusive trap dyke forming the floor of the mountain is described and mapped. The clays and sands are not represented.³

In an article upon the "Rivers of New Jersey," which appeared in 1890, Professor W. M. Davis⁴ throws considerable light upon the questions at issue, regarding the age of the Sand Hills area. In his discussion of the history of the Millstone river, which traverses the district, he says that "the Millstone appears to have been a stream of the normal kind in the previous cycle [post-Cretaceous], before the tilting of the Coastal Plain, when it probably ran southeastward with its fellows, and carried off its share of waste in the baselevelling process of that time. No other supposition than this seems consistent with the general history of the region.

It was during that cycle that the deep gap was cut in the Rocky Hill trap ridge. Then came the deformation of the baselevelled plain, the relatively recent elevation and gentle tilting that have permitted the streams to carve it into a pastplain; and with this, the dislocation along the fall-line. This inclination of the interstream surfaces of the pastplain leaves no doubt that it was tilted to the northwest, and to this tilting we must ascribe the present direction of the Millstone flow."

In the Annual Report of the State Geologist of New Jersey for 1893, Professor R. D. Salisbury, in his admirable work upon the Surface Formations, correlates the gravel upon the higher part of the Sand Hills area with his Beacon Hill formation [= Miocene] of the Mt. Pleasant and Hominy Hills, but at this time states that "It is not determined whether or not the sand of the Sand Hills, or any part of it is to be correlated with the same formation." In his report to the State Geologist for the following year, both the sands and gravels, shown also upon plate III accompanying the paper, are correlated with the Beacon Hill formation, while other gravels resting upon the slopes and represented as covering the lower edges of the sands, and overlying the clays, shales and trap are placed in the Pensauken formation, thus dividing the gravels and placing the lower in a much later horizon. Professor Salisbury explains the occurrence of the Miocene deposits upon the top of the Sand Hills area by a considerable deformation in the Coastal Plain strata, since the Miocene is found at much higher elevations to the southeastward. In a paper in the Bulletin of the Geological Society of America, published about the same time, the thickness of the Miocene of the Sand Hills is estimated at 100 feet.¹ In the last report of the State Geologist for 1895, the same author states, that the Miocene sands and gravels rest directly upon the Raritan Clay, as earlier recorded by Professor Cook.

Professor L. F. Ward, in his article upon "The Potomac Formation" in the Fifteenth Annual Report of the U. S. Geological Survey, which has recently appeared, correlates all of the Raritan formation of New Jersey with the upper division of the Potomac formation of Maryland and Virginia, and refers to "the clays in direct contact with the Red Sandstone of the Newark system as far west as the Sand Hills and Ten Mile Run."²

A review of the more important literature dealing with the Sand Hills region shows, as above indicated, considerable divergence of opinion regarding the interpretation of the sands and gravels. In the absence of fossils and sufficiently distinctive lithological characters, an intimate knowledge of the sequence of the deposits and of the structural relations of the entire series of Cretaceous-Tertiary strata in the area to the eastward, has been brought to bear in the settlement of this question. Detailed investigations have recently been carried on by the authors, in connection with the mapping of the Cretaceous-Tertiary formations in the New Jersey area, under the auspices of the U. S. Geological Survey and State Geological Survey of New Jersey.

STRATIGRAPHICAL RELATIONS.

The floor of the Ten Mile Run Mountain is made up of shales and trap of Jura-Trias age. The trap which penetrates the shales has been so exposed by erosion, as to make superficially a rough approximation to the letter Y, with the opening directed toward the northeast, and the limb extending southwest, forming the core of Rocky Hill ridge, north of Princeton. In the angle of this Y rest the unconsolidated deposits, the character and relations of which it is the especial purpose of this paper to discuss.

This series consists of three members: at the base is a clay, in the middle a mixture of gravel and clay, at the top a sand, which is by far the thickest and most conspicuous member. The clay member, which rests directly on the eroded surface of the Jura-Trias base, is extremely plastic, and changeable in color, varying from drab to red. Its thickness is not absolutely known at all points, on account of the obscurity of the contacts. Enough, however, has been gleaned from a careful study to warrant the conclusion, that the thickness, although variable, is on the average between 10 and 15

¹ Page 342.² Amer. Jour. Sci., Vol. 35, 3rd Ser., 1888, p. 135.³ Bull. U. S. Geol. Survey, No. 67, 1890, pp. 59-61.⁴ Nat. Geog. Mag., Vol. II., 1890, p. 107.¹ Vol. 6, 1895, p. 484.² Page 337.

feet. Something has been learned from the two pits which have been opened. One of these, located on the old turnpike, three-quarters of a mile northeast of the point where Oakley Brook crosses the highway, is now abandoned, and furnishes little information beyond the fact that the clay there occurs down to a depth of at least ten feet, and that it is overlaid by gravel. The other pit, located on the main road, three-quarters of a mile southwest of Ten Mile Run, has been dug to a depth of some 30 feet without reaching the foundation rock. This is, however, an abnormal thickness, and it is believed to be caused by the filling in of an irregularity which existed in the topography of the Jura-Trias, prior to the deposition of the unconsolidated deposits.

The next member in order of ascent is the gravel-clay mixture. The clay is of the same appearance as that described as belonging to the underlying member. The gravel, which is composed largely of quartz boulders with occasionally a sprinkling of iron stone fragments more or less rounded, varies in texture from pebbles, the size of a walnut or even smaller, to boulders several inches in diameter. The average size of the constituents is about that of a hen's egg. It is believed that this member has an average thickness of about 10 feet, and that it is continuous throughout the mountain as a bed, intermediate between the pure clay below and the sand above. The reasons for drawing the above conclusions are both general and specific; for in the majority of instances in descending from the sand to the clay the gravel member is passed through, as shown in certain instances by the gravel forming the beds of the brooks at this elevation, in which case it appears suddenly, and in other instances by the boulders being scattered thickly over the surface, precisely in the above mentioned relation. The specific data lie in the fact that the clay diggers in opening the pits mentioned in both instances have thrown aside a considerable portion of this gravel in order to reach the clay below. At a farmhouse situated directly under the 321 foot elevation, a well has been sunk, and here the workmen passed through four feet of sand and 12 feet of gravel before they reached the clay. As the sand could hardly have been washed into its present situation, the intermediate position of the gravel member seems by this well digging, to be conclusively established. At the pits the gravel is seen in fresh diggings, resting on an irregular surface of the clay, a fact which suggests a change in physical conditions, and it is not impossible that it marks an unconformity in the strata, such as might be expected in the same group of beds, if formed near the shore, as these deposits undoubtedly were.

The superior and most conspicuous member is that of the sand. This is best exposed where the turnpike cuts the 273 foot hill, and at the 249 foot hill where the surface has been dissected in grading for the "New Road." As seen at the former exposure, the deposit consists of a quartz sand, with scattered angular grains varying in color from white to red, but with the latter color prevailing. Bands of iron stone, of a thickness sufficient to render them of local economic importance, are developed at this point. At the second exposure the sand is not as red and exhibits distinct cross-bedding. At both these localities and elsewhere the grains increase considerably in size in certain bands, and may reach that of a pea in dimensions, or infrequently much larger. This is best seen upon the tops of the hills where the finer materials have been removed, leaving the coarser gravel behind. The thickness of this member, as indicated on the map, is very variable. In no portion of the region is it so well developed as about the Sand Hills. Here, due to the presence of the iron-stone bands which have delayed erosion, a thickness of nearly 100 feet is present. The sand west of the 249 foot hill is exceedingly thin and locally disappears, leaving exposed on the surface the gravels of the member immediately beneath.

Upon the lower portions of the region, embraced within the limits of the map, especially in the southern and southwestern areas, superficial gravels of much more recent age have been well described by Professor Salisbury, but they do not especially concern the points at issue in this paper, and will not be further discussed. Their areal distribution is not represented upon the map. These superficial deposits have buried the region and rendered boring so extremely difficult that the clay area in the southeastern portion of the map has not been actually observed within its limits, and the exact line of contact with the Jura-Trias is a matter of some doubt; nevertheless, the relations of the main clay belt throughout the regions to the southeast, of which this is a part, are such as to lead the authors to suspect its presence in this locality, and it is accordingly entered upon the map.

CORRELATION OF THE DEPOSITS.

In the absence of the direct connection of the deposits of the Sand Hills area with the Coastal Plain formations to the eastward, and also of distinctive fossils absolutely to determine the age of the beds, these two important classes of criteria in the correlation of strata cannot be employed and the questions at issue must be approached in other ways.

An examination of the sequence of the Coastal Plain deposits, of which the Sand Hills area is an outlier, shows a series of formations, each characterized by distinctive features which prevail over wide areas. The basal member of this series, known as the Raritan formation, is composed of characteristic clays, sands and gravels, which lie directly upon an uneven floor of crystalline rock, shale and trap. The same conditions have been already discussed in the Sand Hills, and the lithologic similarity of the basal clays, above described, has led to their reference to this formation by all observers.

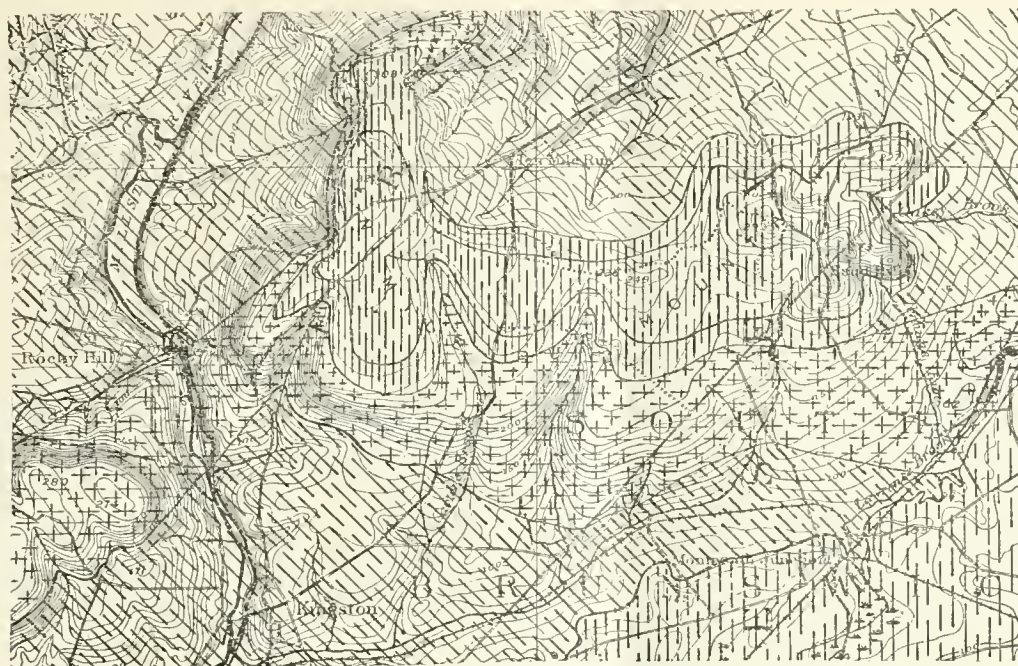
The overlying gravels and sands, however, have been separated and commonly held to be of much later age. An examination of the Raritan deposits in openings which have been made to the southeast along the line of dip, reveals the fact that exactly similar materials exist there as in the Sand Hills. The Raritan deposits are very variable, coarse beds of sand and gravel frequently lying irregularly over clay and showing in a marked degree the cross-bedded features which have been above described.

A well boring at Hightstown, about ten miles to the southeast, throws much light upon this point. This well opening started at an elevation of 108 feet, and at a depth of about 100 feet penetrated the Raritan formation. As the well entered the crystalline rock at a depth of 482 feet, the Raritan formation at this point must have a thickness of from 350 to 400 feet. Gravels and coarse sands are reported at depths of about 250 feet, and still coarser gravels and sands at depths ranging from 385 to 435 feet. In the other beds penetrated clays and fine sands predominated. Nearly identical sections are shown by other wells at the same place. A well of much importance in this same district, although slightly to the north of the line of dip, was opened at the State Reform School in the years 1879 and 1880, an account of which is found in the Annual Report of the State Geologist for those years. The descriptions given show that the beds penetrated have many points of resemblance to those of the Hightstown area. All these various borings afforded materials similar to those found in the Sand Hills area.

Farther to the south, along the line of strike, similar relations are found, the strata at times appearing in surface exposures. These features then may be regarded as characteristic for the formation in this region. Furthermore, a projection of the normal dip lines observed in the main body of the formation shows that the strata of the Sand Hills fall approximately into position with those to the southeast, and the most natural conclusion is that they form part of the same series.

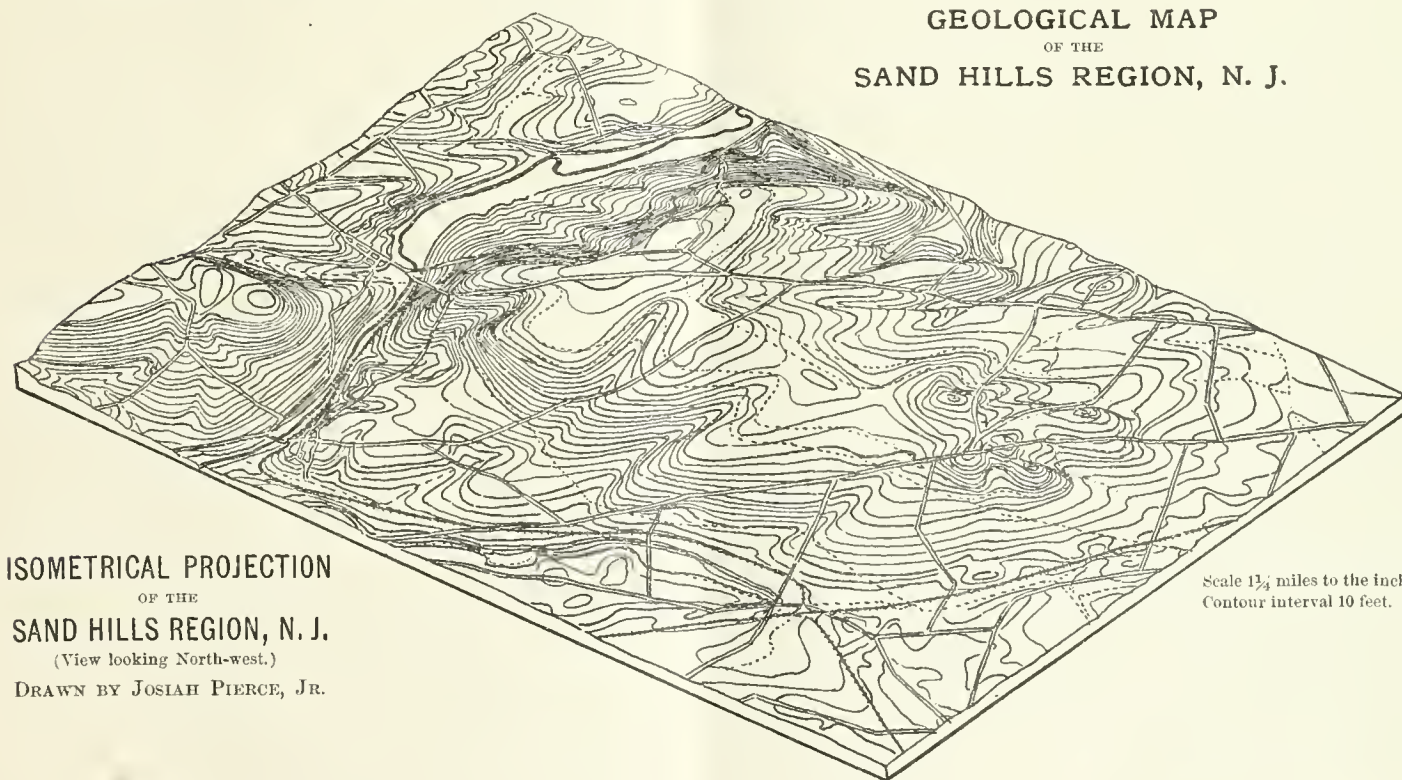
An examination of the later Cretaceous formations reveals deposits of such different character throughout their whole area of occurrence, as conclusively to debar from consideration the possibility of correlating either the clay or sand member of the Sand Hills series with them.

Regarding the Miocene there is more question, as the sands are of somewhat similar character, although the clays are very different. Why may the sands of the Sand Hills not be separated from the clays and correlated with these deposits? In the first place the sands are less like those of the Miocene than they are like those of the lower Cretaceous, although this would not be insuperable, as lithologic similarity in so changing a material as sand is often a vague and uncertain quantity. In the second place structural changes of considerable magnitude would be required to account for the occurrence of Miocene deposits upon the Sand Hills. The nearest Miocene deposits along the line of dip are found in the vicinity of Pine Hill, about 13½ miles to the southeast of the Sand Hills area. Here the base of the Miocene has an elevation of about 300 feet, and if the strata were continued to the northwest with the same dip which is found to the southeast of this area, should occur at an elevation of not less than 550 feet in the Sand Hills regions. As the base of the sands is found at an elevation of only 200 feet, a northwesterly tilting of 350 feet in the distance of 13½ miles would be necessary, considering the Pine Hill region as the exact axis of the folding, or a far greater change if the axis were moved toward the Sand Hills, or if produced by faulting at any point in the intervening district, where the absence of the Miocene does not admit of a study as to

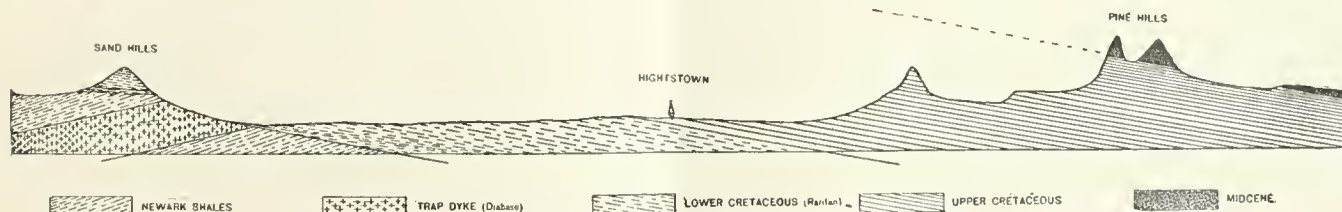


Scale $1\frac{1}{4}$ miles to the inch; contour interval 10 feet.

GEOLOGICAL MAP OF THE SAND HILLS REGION, N. J.



Scale $1\frac{1}{4}$ miles to the inch.
Contour interval 10 feet.



Horizontal scale 3 miles to the inch; vertical scale exaggerated five times.

VERTICAL SECTION SHOWING THE RELATIONS OF THE SAND HILLS DEPOSITS TO THE COASTAL PLAIN FORMATIONS.

its relations to the older deposits. No indication of such tilting has been detected in the main body of Cretaceous strata, which reach to within a few miles of the Sand Hills, or in the regions to the north or south, but on the contrary the same general dip has been observed here as at other points. Furthermore, the Miocene cannot be found elsewhere in New Jersey resting upon lower Cretaceous strata, and only in a single instance have we evidence of its contact with other than the middle and upper members of the upper Cretaceous. That such contact may have occurred by overlapping along the western margin of the Coastal Plain is not impossible; in fact relations of this sort, without evidence of structural disturbance of any moment, are found in Maryland, at Catonsville, to the west of the "fall-line," where a thin deposit of Miocene occurs overlying the basal Cretaceous at an elevation of nearly 500 feet, and distant about 19 miles from its nearest outcrop in the South river region, where it is found at only 125 feet, the normal dip of the formation being retained throughout this distance; but that such a volume of Miocene material, as the sands and gravel of the Sand Hills, could have been deposited in that area, even at the proper elevation, seems quite impossible, for reasons which will be presented below regarding the physiographic history of the area.

The correlation of the sands of the Sand Hills with deposits of more recent date is quite out of the question, as Professor Salisbury has shown them to be of very different character, of much less thickness, and all of them to occupy lower levels.

Another line of argument to show that the Sand Hills deposits are of Cretaceous age, is afforded by the work of Professor Davis upon the rivers of New Jersey. Professor Davis states that the Millstone river, which crosses by a deep gorge the one mile trap dyke, forming the floor of Ten Mile Run Mountain on its northeastern bank, and Rocky Hill on its southwestern, was superimposed upon this region through Cretaceous sediments, and that by a slight northwesterly tilting, shown by the crest lines to have been but a few feet in the mile, its course was later reversed, so that it now flows across the "fall-line" toward the west, the single instance of this sort known on the Atlantic border. Professor Davis regards the northwesterly course of the Millstone river as evidence that even less movement has taken place on the "fall-line" here than elsewhere, while the other facts point to a similar conclusion. This would entirely preclude the possibility of any such burial of the drainage beneath a cover of Tertiary sediments, as the sands of the Sand Hills would require, should they be regarded as belonging to that age. The stream could hardly have found its old valley lines again as completely as its present course would indicate, nor could the general drainage of the area have been as fully perfected as it has been in the relatively brief period which has elapsed since the later Tertiary. Moreover, the sky-line representing the old Cretaceous peneplain gives evidence, so far as has been determined, of but a single superimposed system of drainage which has been gradually adjusting itself to its present surroundings.

The questions at issue in the interpretation of the Sand Hills deposits are of far greater importance than the mere determination of the local beds, since both the stratigraphical and structural relations of the whole Cretaceous-Tertiary series are involved. If the Sand Hills deposits are placed in the Cretaceous, as it seems they should be from the evidence adduced, the normal conditions observed elsewhere in the northern Coastal Plain are not disturbed, while if regarded as of later age, or assigned to two horizons as widely separated as the lower Cretaceous and the Tertiary, very unusual relations are found that require special explanation, and the introduction of structural changes not found in other portions of the region. On the evidence, therefore, presented in the preceding pages, the Sand Hills deposits are referred to the Raritan formation.

THE PRINCIPLES INVOLVED IN PROJECTING PANORAMIC VIEWS FROM CONTOURED MAPS.

By JOSIAH PIERCE, JR.

A topographical map is the representation in miniature of a portion of the earth's surface, and can be regarded as the projection of a relief model of that surface upon a horizontal plane, the point of view corresponding to a position vertically above the surface.

The problem involved in the construction of bird's-eye views is the projection of such surfaces from other points of view and upon other than horizontal planes, from the data furnished by maps.

The continuous lines on any surface joining points at the same elevation, or contours, define the outlines or sections of the surface by horizontal planes. In general the contours on a map are sections by a series of equidistant horizontal planes, and are parallel to the plane of projection or map. An infinite variety of surfaces can exist, in high or low bas-relief or intaglio, having the same general characteristic forms and contours, but differing greatly in vertical scale, as, for example, a relief model and its cast or its reflection in a mirror.

The shadows cast on an irregular surface by a beam of light occur where ridges or irregularities on the surface exist, and increase in magnitude or area according to the direction of the rays.

The illuminated areas are evidently those which would be visible from the source of light, looking in the direction of the rays, and the areas in shadow are those which would be invisible owing to the ridges and projections on the surface. When the point of view is chosen on the surface of the model the ridges should be similar in form to those visible in nature from a corresponding position.

The problem of the determination of such outlines and areas occurs in the projection of bird's-eye views from maps and its solution can most easily be found under any given conditions by using the important information of surfaces given by contours.

Each contour can be regarded as the locus or path of a point moving around the surface at a definite elevation, or equally well as the plane figure or section in a horizontal plane generated by a line which passes through some fixed point in space. If all the points of such a figure are joined to some fixed point a cone of rays is formed of which the point is called the vertex or centre of projection and the figure is a section or base. The section of such a cone by any plane is called an image or projection of the object, and to every point of the image there will correspond some point lying on the same radiant on the object. Figures thus related are said to be in perspective, and may differ widely in form while possessing important points of similarity. In the particular case where the point of view is at an infinite distance, the radiants become parallel, or meet at infinity and the projection is called parallel, and in the case where these radiants are perpendicular to the plane of projection, the projection is called orthogonal or orthographic, as is the case in the projection of a map.

Evidently in all cases parallel sections of the same cone are similar in form and differ only in scale according to their perpendicular distances from the centre of projection, and are of the same form and scale when the radiants are parallel.

The projection of an irregular plane figure of any form is easily accomplished by consideration of the fact that it may be enclosed in a square or net of intersecting lines. By the laws of projection every straight line projects into a straight line, so that a net of intersecting lines can be easily projected into another of desired form or distortion which will intersect the image of an irregular figure in corresponding points. Hence, a relief perspective of any surface whatever can be projected by developing on a plane the successive contours or plane sections of the surface, upon the same principle that a relief model can be built up by cutting out of cardboard of uniform thickness the contour outlines and by pasting the successive sections one on top of another in their correct relative positions.

The actual surface developed is the one joining the successive edges or steps, and it will be seen upon examination of the accompanying illustration that ridges only appear as the contours touch or overlap each other in projection or whenever the rays from the point of view touch the surface.

Consider the projection of a cube.—In the particular case of orthographic projection where the diagonal of the cube is perpendicular to the plane of projection, its edges are equally inclined to this plane and its outline becomes a regular hexagon. In this case or isometrical projection the three axes or edges intersect at 120° and equal scales can be applied upon them. In the illustration (page 15) the map was first projected as a plane figure upon one face of such a cube, and each contour was transferred to its proper plane by equidistant movements of the diagram parallel to the third axis. An entire surface can be said to be generated by contours of varying form which assume definite shapes at successive elevations and which pass insensibly from one form to another.

By the projection of contours the problem is reduced from an exceedingly complex study in projection of an irregular surface to one of plane geometry.

ABSTRACTS OF PAPERS READ AT RECENT MEETINGS OF THE UNIVERSITY SOCIETIES.

Neutrality of the American Lakes. J. M. CALLAHAN.

[Abstract of a paper read before the University Historical Association and before the American Historical Association.]

American settlements and American diplomacy, together with the jealousies which existed between the European powers, enabled the United States at the close of the Revolutionary War to secure the Great Lakes as a northern boundary, and prevented the new nation from being confined between the Alleghanies and the sea. The refusal of England to surrender the posts south of the lakes, the proposals of Canadian traders to change the dividing line, and the later attempt of England during the war of 1812, both by fleets and negotiations, to keep the United States away from the lakes, all testify to the reluctance with which she agreed to that boundary, which was finally assured by the Treaty of Ghent in 1814.

The United States now had the same rights as Great Britain upon the lakes. But the new danger of rival navies threatened to become a source of misunderstanding and collision. England felt that her force in that quarter should be increased as a protection for Canada. The United States government, however, had no designs against Canada, and did not wish to enter into a perpetual race of naval construction. To prevent unnecessary expense, and to guard against future hostilities, the United States government proposed a mutual disarmament on the lakes. The British government finally met the proposition, and in April, 1817, an arrangement was made to limit the lake force of each party to four vessels of 100 tons burden and with restricted duties. All other vessels were dismantled, and in a few years the force on each side entirely disappeared.

The excited condition of the border during the internal troubles in Upper Canada in 1837-8 led to a temporary increase of force by the British, and the debates in Congress growing out of the existence of this force finally led to the building of the U. S. S. "Michigan," which has been the only naval vessel cruising upon the lakes since 1844. The "Michigan" is larger than a strict interpretation of the agreement of 1817 would allow, but Great Britain has made no objection for many years.

During the Civil War the United States government increased its "observing force" on the lakes, in order to prevent confederate raids from Canada. In January, 1865, Congress abrogated the Agreement of 1817; but when Canada, soon after, passed a more efficient law to secure neutrality, Secretary Seward withdrew the notice to abrogate which had previously been given to the British government.

The spirit of the agreement is still observed. The antiquated character of the "Michigan," the reported strength of Canadian "cutters," and the refusal of the navy department to accept bids from lake builders, have been the occasions of attempts to secure the abrogation of the agreement, but it has been generally conceded that the neutrality of the lakes should be continued.

The Transition of North Carolina from a Colony to a State. E. W. SIKES.

[Abstract of a paper read before the University Historical Association.]

The province of North Carolina by its armed resistance to the execution of the "stamp act" had protested against interference in trade on the part of Great Britain, and the illegal exactions by crown officials had produced the so-called "Regulator war." But no sooner had these matters been settled than others rose. The western part of the southern boundary line had never been legally determined. When finally the royal instructions appeared it was seen that the line indicated would deprive the province of a large piece of territory. The colony was so displeased that the Assembly refused to establish the line.

The Assembly further declared that the special tax on imported liquors and on the poll had fulfilled their object and should be no longer collected. The Governor insisted, ordered the collection, as heretofore, but the Assembly forbade it. These disputes led up to the more important problem of the judicial system.

The Act creating courts for the province expired in 1771. The crown forbade the reenactment of the clause which gave the province the right to attach the property of persons non-resident. The Assembly refused to pass any court laws without this privilege; the crown refused to accept any with it, consequently the province was practically left without any sufficient courts till 1776. These were the main causes that led to the meeting of the first Provincial Congress and soon to the destruction of royal authority.

After Gov. Martin fled the province in the spring of 1775, the county committees were all-powerful. To curb their power a Provisional Government was established in the fall of 1775, with a Provincial Council for the entire State and District Committees of Safety for each of the six districts. To these committees the county committees were subject. The efficiency of this government is shown by its military activity in sending assistance to Virginia and South Carolina and in subduing the dangerous uprising of the Scotch loyalists.

After complete separation from Great Britain had been determined upon, there was some difficulty experienced in passing from a dependent colony to an independent State. At the spring meeting of the provincial congress in 1776, it was determined to establish a form of government under a constitution, but constitution-making was so much in its infancy and the difficulties encountered were so great that the matter was postponed till the next session. The constitution adopted in December, 1776, can lay claim to originality neither in conception nor expression. Maryland furnished the greater part of the Bill of Rights, and many of the clauses in the constitution proper are copied from the constitutions of other States. The general outline of the form of government was recommended by John Adams, but Mr. Adams' recommendation harmonized with the developments under the Provisional Government. That these constitution-makers builded wisely is shown by the fact that their work remained without amendment for fifty-nine years.

The Career of Philip Freneau as a Publicist. S. E. FORMAN.

[Abstract of a paper read before the University Historical Association.]

A discussion of the formative influences of the early life of Freneau, leads up to the opening of his public career, when he appears as the "Poet of the Revolution." A close study of his services as a writer in the cause of American independence, the history of his career in Philadelphia as the editor of a newspaper, and as a clerk under Jefferson, lead to the conclusion that there was nothing underhand, either in the negotiations that led up to his coming, or in his relations with that statesman.

Freneau's career as the editor of the *National Gazette*, presents the following points: (1) Freneau's political aims as an editor were to counteract the influence of the Federal organ, *Fenno's Gazette of the United States*. (2) The thoughts and ideals of leading Federalists in 1791 are clearly seen to have been strongly opposed to popular government. It was Freneau's part to check these aristocratic tendencies. (3) Freneau's opposition to the first administration, and his attacks upon Hamilton, precipitated the quarrel between Jefferson and Hamilton. (4) Hamilton's attacks upon Freneau's character were without proof and were unjustifiable. The Secretary came out of the quarrel with damage to his own character. (5) Freneau supported the French cause after Jefferson had abandoned it. His opposition to Washington was bitter, but was not so scurrilous and indecent as has been represented. (6) Freneau's place in the history of American politics: (a) He was the ablest champion of Jeffersonian simplicity. His war upon titles, distinctions, and court-like ceremonies was effective. (b) Through his paper the strongest opposition to Hamilton's centralizing schemes found expression. (c) His paper did much to give a French coloring to our political philosophy. (d) He was the prototype of the partisan editor.

In the later years of Freneau's life (1794-1832), he is seen both as a sea-captain and as a literary man. He lived to be the Poet of the War of 1812, as well as of the Revolution. In forming an estimate of Freneau's personal character the investigator will find that the man was honest and patriotic.

An examination of his long life reveals nothing base or dishonorable. His influence upon literature was less marked than his influence upon politics. He was, nevertheless, the greatest American poet of his day.

Changes in the Organization of the Church in the Ninth Century. G. C. LEE.

[Abstract of a paper read before the University Historical Association and before the American Church History Society.]

A consideration of the status of the church in the ninth century requires a careful study of the development of the power of the Roman See from the beginning to the appearance of the Pseudo-Isidorian decretals. In making such an inquiry it will be clear that there are two fundamental ideas, by the general acceptance of which the Western church was able to increase in strength and power. These are: (I.) The continuity of apostolic succession in the Roman See from Peter, to whom it was claimed, and generally believed, Christ gave transcendent authority. (II.) The doctrine of the maternity of churches. The growth of Patriarchates and Vicarates, the canons of the various councils which bear upon the organization of the church are matters which have to be considered in chronological development.

Ecclesiastical organization was further affected by the changed relations of church and state produced by the rise and fall of the Carolingian dynasty. A crisis appears in the time of Charles the Bald and the struggle centers about the personalities of Pope Nicholas I and Hincmar, Archbishop of Rheims. Their controversies furnish material for the arguments of future popes. In the cases of Ebbo, Wulfardus, Rothardus and Hincmar of Laon, we seem to see the application of the principles of the Pseudo-Isidorian decretals, but it is also clear that these principles were new only in so far as this was the first quasi-legal expression of them. They had in fact been thought for centuries.

A close examination of the leading cases of the period in detail is necessary because of the constant appearance of the influence of Pseudo-Isidore and the gradual progress of principles unknown to canon law. This is traced from the first denial of them, to their full acceptance by the Gallican Church through its great prelate, Hincmar of Rheims. The acceptance of Pseudo-Isidore and the consequent acknowledgment of the supremacy of the See of Rome led to the downfall of the metropolitan system as reorganized by Boniface.

The Latin Suffix —astro—. By GEORGE M. BOLLING, of the Catholic University of America.

[Abstract of a paper read before the University Philological Association.]

For the material cf. Seck, Arch. I 390-404; Sittl, *Ib.* VI 508; Stadler, *Ib.* X 83-115. For previous explanations cf. Schnorr von Carolsfeld, Arch. I 404 ff.; Lindsay, Lat. Lang. 329 f.; Stolz, Hist. Gram. I 543 ff.

The objection to all these explanations is their failing to consider sufficiently the lexical contents of the suffix. The suffix is pejorative, expressing the resemblance of the derivative to the primitive word and generally with a connotation of contempt, "a poor copy of." This highly specialized meaning and the restriction of the suffix to certain congeneric groups of words suggest the working of adaptation, cf. Bloomfield, A. J. P. XII 1 ff.; XVI 409 ff.

The names of plants is the category in which this suffix seems most at home. Here it denotes the wild in opposition to the cultivated plant; oleaster—olea, cf. Vulg. Ep. ad Rom., II 17; Isid. Orig. XVII 7, 61; mentastrum, Pliny, N. H. XX 144; pinaster, Pliny, N. H. XVI 39.

There is some slight evidence for a similar use with names of animals: Du Cange reports catulaster: lo cane salvatico. Etym. Gud.: *Αἰγδοστριος*: αἰξ ἄγριος. But no such meaning attaches to pullastra (?) or porcaster.

Other formations are clearly adaptative, and if this suffix served originally to express the relation between the cultivated and uncultivated varieties of the same plant, its meaning could easily be extended to denote resemblance in general with the connotation of inferiority, and then it could develop into either a pejorative or a diminutive suffix and sometimes fade out into

a mere expression of resemblance. Thus *peditaster 'a mock foot-soldier'; Antoniaaster 'a man that apes Antony.' So, too, it expresses the fictitious relationships, filiaster 'a step-son,' etc.

The congeneric nature of the adjectives formed with this suffix is to be noted. Beside designations of bodily defects, and such colors as lend themselves naturally to such a use, we have only crudaster, novellaster, *mediaster.

For the origin of this suffix with names of plants I would suggest the adaptation of the ending of silvestro—, before its passage into the *i*-declension, being added first to nouns like olca and from these propagating the suffix —astro—.

Notice that the literary expression corresponding to these popular formations is the use of silvester; pinaster: pinus silvestris, cf. the passages cited above. Notice also how in English "wild" has almost passed into a prefix.

I know of no good parallel for this putting of the whole lexical value of an adjective into its suffix, but it does not seem essentially different from the formation—execution, electrocution, *hydrocution.

Diodorus' Sources in the Peloponnesian War. E. L. GREEN.

[Abstract of a paper read before the University Philological Association.]

Diodorus Siculus, who flourished in the second half of the first century B. C., compiled a Βιβλιοθήκη ἱστορικὴ, of which the twelfth and thirteenth books contained an account of the Peloponnesian War. The general consensus is that he drew on Ephorus (cf. Wachsmuth, *Alte Geschichte*, p. 101). A re-examination of the sources by means of the subject-matter and of the language shows that Thucydides was used as well as Ephorus, at least in XII, 41-82, 2. The subject-matter has been carefully examined by others; the language has for that reason been the side especially considered. The vocabulary, syntax, sentence-formation, figures, and certain other peculiarities of treatment show that the narrative falls into four parts: XII, 41-82, 2; XII, 82, 3-XIII, 2-19 (+33, 1); XIII, 36-42, 4 (+34, 1-3); XIII, 45-107, in such a way as to preclude any idea of a single source. The first division that could come from Thucydides and from Ephorus is nearer Thucydides and varies more from Ephorus, as far as can be made out from his fragments, than do the second and third, which could also have Thucydides as a source. The variations from the latter part of the eleventh book, which stands in the same relation to Thucydides and Ephorus, are of great weight. The second part could be referred to Thucydides, Philistus, Ephorus, Timaeus: the last three of these being extant only in fragments make impossible a decision at all certain. The third division comes from Ephorus, as does the fourth, which might come also from Xenophon or Theopompus. Xenophon, it is agreed, was not used; Theopompus, though fragmentary, has certain well-defined points of style, which are not found.

A Scottish Wyclifite New Testament. By WILLIAM HAND BROWNE.

[Abstract of a paper read before the University Philological Association.]

Dr. BROWNE made some remarks on the recent discovery of a MS. dating from the beginning of the 16th century, and containing a Scottish recension of the Wyclifite New Testament. It has hitherto been supposed that the Wyclifite teachings took no root in Scotland, and that the mysterious episode of the "Lollards of Kyle," in 1494, was an isolated phenomenon, followed by no results—a view which students of the Scottish history of that time have found it hard to accept. The existence of a Scottish Wyclifite New Testament seems to indicate that that reformer's doctrines had spread more widely in Scotland (probably in the west) than historians have supposed: and that Tyndale's version was not the earliest in the vernacular introduced into that country. The manuscript will be edited for the Scottish Text Society by the Rev. Walter Gregor, LL.D., and its appearance will be awaited with interest.

HENRY NEWELL MARTIN.

H. NEWELL MARTIN, Ph. D., F. R. S., Professor of Biology in the Johns Hopkins University, from the opening of the University in 1876 to 1893, died at Burley, England, October 27, 1896. The following biographical sketch by his friend and former teacher, Professor Michael Foster, is reprinted from *Nature* (London), November 19, 1896.

"Henry Newell Martin was born on July 1, 1848, at Newry, Co. Down, Ireland. He was the eldest of a family of twelve, his father being at the time a Congregational minister, but afterwards becoming a schoolmaster. Both his parents were Irish, his father coming from South Ireland, and his mother from North Ireland. He received his early education chiefly at home; for though he went to several schools, his stay was not long at any one of them.

"Having matriculated at the University of London before he was fully sixteen years of age (an exemption as to age being made in his favour), he became an apprentice to Dr. McDonagh, in the Hampstead Road, London, in the neighborhood of University College, on the understanding, that the performance of the services which might be required of him as apprentice, should not prevent his attending the teaching at the Medical School of the College, and the practice at the Hospital. It was here that I made his acquaintance in 1867. I was at that time teacher of histology and practical physiology at the school, having succeeded the late Dr. George Harley, and I well remember that Martin asked my permission to attend my course, in face of the drawback that, owing to his duties as apprentice above mentioned, he could only give to the study half the time demanded. I unwillingly gave permission; but soon found that Martin learnt in his half time more than the rest of the students in their whole time; and thus begun a friendship between us, which lasted until his death. During his career at University College, he greatly distinguished himself, taking several medals and prizes. In 1870, he obtained a scholarship at Christ's College, Cambridge, Leversidge, now Professor of Chemistry in the University of Sydney, then a student at the Royal School of Mines, gaining one at the same time; he had, in the summer of that year, conducted at Cambridge a class of Histology for the late Sir G. Humphry. Though elected to the scholarship, Martin had some doubts whether he ought to take it up, and anxiously consulted me on the matter. I believe, that my being able to tell him that I, too, was about to go to Cambridge, having been appointed Praelector of Physiology at Trinity College, finally removed all hesitation. Thus we two went up to Cambridge together in the October of that year. I at once asked him to assist me by acting as my demonstrator, and during the whole of his stay at Cambridge, he was in every way my right hand. His energy and talents made my work much easier, and his personal qualities did much to make natural science popular in the University. At that time there was, perhaps, a tendency on the part of the undergraduate to depreciate natural and, especially, biological science, and to regard it as something not quite academical. Martin, by his bright ways won, among his fellows, sympathy for his line of study, and showed them, by entering into all their pursuits (he became, for instance, President of the Union, and Captain of the Volunteers), that the natural science student was in no respect inferior to the others.

"In Cambridge, as in London, his career was distinguished. He gained the first place in the Natural Science Tripos of 1873, the second place being taken by Francis M. Balfour; at that time the position in the Tripos was determined by the aggregate of marks in all the subjects. While at Cambridge, he took the B. Sc. and M. B. London, gaining in the former the scholarship in Zoology; he proceeded later to the D. Sc., being the first to take that degree in Physiology. So soon as, or even before, he had taken his degree, he began to devote some time to research, though that time, owing to the necessity of his making money by teaching, was limited; his first publication was a little paper on the structure of the olfactory membrane, which appeared in the *Journal of Anatomy and Physiology*.

"In the summer of 1873, I had assisted the late Professor Huxley in the course of Elementary Biology, which he initiated at the Royal College of Science, and in the following year, I introduced a similar course into my teaching at Cambridge. In this Martin was my chief assistant; he also subsequently acted as assistant in the same course to Professor Huxley. One result of this was that he prepared, under Huxley's supervision, a text-book

of the course which, under their names, appeared with the title 'Practical Biology,' and which has since been so largely used.

"In 1874, he was made Fellow of his College, and giving himself up with enthusiasm to the development of natural and, especially, of biologic science at the University, was looking forward to a scientific career in England, if not at Cambridge. About that time, however, the Johns Hopkins University at Baltimore was being established, and such was the impression made by Martin upon those with whom he came in contact, among others Dr. Gilman, of Baltimore, that in 1876 he was invited to become the first occupant of the chair of Biology which had been founded in the Johns Hopkins University. This offer he accepted, and thus nearly the whole of his scientific career was passed in America. He went out prepared to develop in his new home the higher teaching of biologic science, especially that spirit of research which alone makes teaching 'high;' and during the rather less than a score of years which made up his stay at Baltimore, he produced a very marked effect on American science, fully working out the great aim of the University which had adopted him. By himself, or in concert with his pupils, he carried on many important investigations, among which may especially be mentioned those on the excised mammalian heart, one of which formed the subject of the 'Croonian Lecture' of the Royal Society in 1883. These were, in 1895, republished in a collected form by his friends and pupils in America, under the title of 'Physiological Papers.' And he sent out into the States a number of trained physiologists, fired with his own enthusiasm, who are continuing to advance the science, and one of whom has succeeded him at Baltimore. He also found time to write expository works, and his 'Human Body,' 'Briefer Course' and 'Elementary Course,' deservedly became very popular in the States.

* * * * *

"He was elected into the Royal Society in 1885; he also received the title of Hon. M. D. from the University of Georgia.

"Martin married in 1879, Mrs. Pegram, the widow of an officer in the Confederate army; but there was no issue; and in 1892 his wife died.

"Even before his wife's death his health had begun to give way; and after that event, he became so increasingly unfitted for the duties which his own previous exertions had raised to a very great importance, that in 1893 he resigned his post. After his resignation he returned to this country, for he had never become an American citizen, and was looking forward to being able, with improved health, to labour in physiological investigations, either at his old University, or elsewhere in England. But it was not to be. Though he seemed at times to be improving, he had more than one severe attack of illness and never gained sufficient strength to set really to work. During the past summer he visibly failed; and while he was striving to recover his strength by a stay in the quiet dales of Yorkshire, a sudden haemorrhage carried him off on October 27, at Burley-in-Wharfedale, Yorkshire.

"Having been for so long a stranger to this country, Martin was, personally, but little known in English scientific circles; in America, however, not in Baltimore only, but in many other parts of the States, especially among the younger physiologists, he has left behind him a memory which will not soon pass away; while those who knew the brightness of his early days in this country, will always hold him in affectionate remembrance. And it may here, perhaps, be granted to myself to say that I can never forget what he was to me in my early days at Cambridge, and the sadness which I am feeling in the thought that he now, as well as Balfour, is no more, is mixed with pride at having been a help to two such men."

M. FOSTER.

There is also a biographical sketch by Professor Foster of Professor Martin in the *Proceedings of the Royal Society*, Vol. LX, No. 364, Dec., 1896; and a review of Professor Martin's "Physiological Papers," by Professor Locke, in *Science*, January 16, 1897.

A volume containing Professor Martin's principal scientific papers was published in Baltimore, 1895, by his friends and former pupils. The committee of publication was composed of President Gilman and Professors Brooks, Howell and Welch. The introductory note to the volume reads as follows:—

"Professor Henry Newell Martin held the chair of Biology in the Johns Hopkins University from 1876 to 1893—a period of seventeen years. To the great regret of all his friends, he was compelled by ill health, in the summer of 1893, to resign his professorship and return to England. As a teacher,

lecturer and investigator, Dr. Martin has exerted a deep influence upon the character of biological instruction in this country; the development of experimental research in animal physiology has, however, been the object of his most earnest labor, and in this department of biology he has made brilliant additions to our literature. In recognition of the value of his work and as a token of their affection and esteem for him, his friends and pupils have undertaken the publication of this collection of his papers. The committee entrusted with the preparation of the volume have selected from Professor Martin's writings some of his public addresses and all of his contributions to experimental physiology made during his connection with the University. Many of the publications of his pupils inspired by him might have been included in the collection, but it is thought better to restrict it to those papers which appeared under his own name."

THE UNIVERSITY AND THE CITY.

A SPEECH BY PROFESSOR GILDERSLEEVE, JANUARY 1, 1897.

[On January 1 a luncheon was given by the Trustees and Professors to those who have recently contributed to the fund for the relief of the University. Addresses were made by President Gilman, Mr. C. Morton Stewart, Mr. W. W. Spence, Mr. Eugene Levering, Professor Gildersleeve, Hon. William A. Fisher, and Mr. C. M. Howard. Professor Gildersleeve's speech is printed below.]

I am glad that the toast to which I am to respond has taken this form, the University and the City, instead of the old phrase Town and Gown. In Town and Gown, there is a traditional note of hostility. There is a vision of armed conflict, of bludgeons and quarter-staves, of broken heads and bloody noses. In University and City, there is no discord; and to-day, there is a clear ring of perfect harmony, symbolized by song and psaltery,—college song and banjo psaltery. The festive board at which we are sitting is itself an orchestration with its musical glasses and its tuning forks and its pipe of peace. Here the once rival sisters, Leah and Rachel, meet and rejoice in the fruit of their labors, for Leah, you remember, was the mediæval symbol of the active life; Rachel, the symbol of the contemplative life; and so Leah may well stand for the City and Rachel for the University. But contemplation is naught unless it transmutes itself into action; and action needs for its perfect work the serene light of contemplation,—looking before and after. And as Leah and Rachel and their handmaids did their several best to fill out the zodiac of Jacob's sons, so all the spiritual and material forces of Baltimore should unite to make a belt of glorious constellations for Maryland, for the Union. In this work, University and City must be one, and as the strong hands of the City have been held out to the University, so the great heart of the University goes out to the City. To-day marks a happy union. We march not merely side by side, but hand in hand. Not that there ever was any sense of strangeness in Baltimore that I could feel, for my acquaintance with this city ante-dates that of most of the natives who are present at this joyous meeting. It was in December, 1847, that I first saw the place where I was to pass twenty of the happiest years of my life. The Baltimore and Ohio stopped at Cumberland. It has gone further since, not to say too far. The country began just beyond the Washington Monument, and Battle Monument was the heart of things. On that memorable occasion, I put up at a hostelry that bore the romantic name of "Fountain Inn." The site was not so perilously down-town as it is now. I say perilously down-town, for no sooner do I put my foot in that neighborhood to-day, than I am sure to encounter some of the guardians of the Exchange who are equally sure to express the utmost surprise at meeting an aged lamb of the University fold so dangerously near the Stock Yards where the innocents are slaughtered. There is a certain tenderness blended with the cordiality, that goes to my heart, and the hearts of my colleagues. Recent events have taken some of us down to those dangerous regions more frequently than of old and to-day we are proud and happy to receive your return visit in this quiet university home, in whose quietness and whose confidence there is strength.

The relations of a City to a University, of a University to a City, cannot be adequately set forth in a brief after-dinner speech, and I will content

myself with one or two parallels that have occurred to me on this occasion. When the University Club was opened, some nine years ago, I called the attention of the members to the fact that one of the greatest of mediæval universities, the University of Bologna, which celebrated its eight hundredth anniversary the same year, was founded in a large and flourishing city—a city which was proud of its university and bore on its shield the motto: "Bononia docet"—"Bologna is a teacher." Yes, Bologna was a teacher, is a teacher still. But "Bologna la grassa" was also noted for its good living,—not unlike Baltimore in this respect; and he who contends that Baltimore is not the true home of a great university should remember Bologna's sages and Bologna's sausages. I know full well that there is a saying current about plain living and high thinking, coined in England and taken up by an American set. But I think that every fair-minded man, unbiassed by the gout, will see that much is to be urged in favor of the reverse formula—high living and plain thinking. There is too little plain thinking in the world now, and not enough high living for some of us.

But there is another university town, of which the image is fresher in my mind and nearer to my heart than the image of Bologna, and that is Athens—an image which haunts me night and day and even in this goodly fellowship the radiant presence of Athens makes itself seen, and the classic charm of Athens makes itself felt—blended inextricably with the radiance and the charm of Baltimore. Athens was a commercial city; Athens became a university city—in this not unlike Baltimore. She was not only, as Cicero calls her, the inventress of all branches of learning, but the inventress of all manner of arts; and as in the Baltimore of to-day numberless small industries flourish, so was it in Athens. She became in time a great emporium. True, she was not so lucky as to have a Chesapeake Bay, but she had her Canton, her Locust Point. You can see to this day the foundations of the docks in which her ships were built, the clippers of the period which went trading over the Mediterranean, called by the Greeks their sea, and along the shores of the Euxine. Her olive oil and her pottery were famous everywhere, were exported to every part of the earth. For olive oil I am afraid we will have to substitute petroleum, which, at all events, is pervasive enough, and the Chesapeake Pottery is only in its beginning, but who knows? The trading was brisk and the list of imports would remind you of our own at more than one point. But the trade passed away, and in her last estate Athens became a university town, and the glory of her schools rested like evening sunshine on the Athens of the Roman Empire. I cannot imagine any period when the sceptre of commerce shall depart from Baltimore; but if it does, let the sceptre be transmuted into the magic wand of Science and of Art which shall evoke the past and call up the future of the world. But when I think of Athens and her kinship to Baltimore, I am not thinking of ancient Athens alone. I am thinking of modern Athens as well. Modern Athens owes her resurrection, in great measure, to the liberality of private individuals, and these not always sons of Athens, nay, most of them not even citizens of Greece. From Egypt in the south, from Austria in the north, from Greek lands east and west, still under the domination of the Turk, have come noble gifts to build and to endow the marble palaces that make modern Athens resplendent. The Academy of Sciences, the Polytechnic Institute, the National Museum, the Library, the Palace of the Exposition, the Boys' High School, the Girls' High School—these are due to the liberality of rich Greeks. These are buildings which, taken from a city of a hundred and twenty-five thousand inhabitants, not a fourth, not really not much more than a fifth the size of Baltimore, would leave her an overgrown village. Modern Athens is little more than sixty years old, and incalculably poor, as Baltimore is incalculably rich, according to the assessors. But in the devoted patriotism of men of Greek blood, she has an inexhaustible treasure. The capital of love and pride may not be bankable in one sense, but it is laid up beyond the reach of bulls of Bashan and bears of the wood, and the drafts that have been drawn on that capital have, of late, been nobly honored here, as they have been so abundantly honored in Athens, and we, of the University, shall feel in all our work that we are upheld by the love of the citizens of Baltimore for their city and our city; and as we work on in good heart and high hope, we shall endeavor to be worthier and worthier of the pride which the citizens of Baltimore have learned to take in our university and their university.

RECENT PUBLICATIONS IN HISTORY AND POLITICS.

The following list enumerates publications, within the past year, in the department of History and Politics, by those who are now or who have been members of the University. It is printed for the information of their friends and colleagues and is not supposed to be complete.

- ADAMS, HENRY CARTER. Seligman's Essays on Taxation. (*Annals of the American Academy, Phila., March, 1896.*)
- ADAMS, HERBERT B. Amherst: Town and College. (*Amherst Book, N. Y., 1896.*)
- English Chautauqua. Experiences in the British Isles. (*Baltimore Sun, September 30, 1896.*)
- Biographical Sketch of Herbert Tuttle. Introduction to Vol. 4 of Tuttle's History of Prussia. (*Boston: Houghton, 1896.*)
- Amherst and Lord Amherst. (*In History of the Town of Amherst, Mass., 1896. O.*)
- Report of the Twelfth Annual Meeting of the American Historical Association. (*The Independent, Jan., 1897.*)
- ANDREWS, CHARLES M. The Historical Development of Modern Europe from 1815 down to 1880. (*N. Y.: Putnam's, 2 Vols., 1896.*)
- The French Republic. (*The Chautauquan, October, 1896.*)
- ARNOLD, B. W., JR. History of the Tobacco Industry in Virginia from 1860 to 1894. (*Studies in History and Politics, 1897.*)
- Dissertation for the Degree of Doctor of Philosophy.
- BALLAGH, JAMES C. The Scotch-Irish in America. (*Illustrated American, July 11, 1896.*)
- Review of Wm. Holden Hutton's "Philip Augustus." (*The Citizen, Phila., Nov., 1896.*)
- Review of Follett's "The Speaker of the House of Representatives;" Review of Bruce's Economic History of Virginia. (*The Citizen, Dec., 1896, and Feb., 1897.*)
- BASSETT, JOHN S. The Culture Problem in Southern Towns. (*The Methodist Review, July-August, 1896.*)
- The Regulators of North Carolina (1765-1771). (*Annual Report of the American Historical Assoc. for 1894. Washington, 1896.*)
- Historic Hillsboro. (*The Trinity Archive, Dec., 1896.*)
- Edward Graham Daves. (*Historical Papers, Trinity College, N. C., 1897.*)
- BEMIS, EDWARD W. Some Municipal Problems. (*The Forum, March, 1896.*)
- Cooperative Distribution. (*Bulletin of the U. S. Department of Labor, September, 1896.*)
- BLACKMAR, FRANK W. The Promises of Democracy: Have they been fulfilled. (*The Forum, June, 1896.*)
- A Chapter in the Life of Charles Robinson, the First Governor of Kansas. (*Annual Report of the American Historical Assoc. for 1894. Washington, 1896.*)
- The Story of Human Progress. (*Leavenworth, 1896.*)
- BRACKETT, J. R. Democracy vs. Aristocracy in Virginia. (*Sevanee Review, May, 1896.*)
- BROUGH, C. H. Salisbury and the Venezuelan Question. (*The Home Magazine, Feb., 1897.*)
- BUMP, CHARLES W. Monuments to Washington. (*Baltimore Sun, February 22, 1896.*)
- CALLAHAN, J. W. The Northern Lake Boundary before 1783. (*Indiana School Journal, August, 1896.*)
- The Teaching of History. (*Ib., March, 1897.*)
- CARVER, T. N. The Shifting of Taxes. (*The Yale Review, Nov., 1896.*)
- CHANDLER, JULIAN A. C. Representation in Virginia. (*Studies in History and Politics, 1896.*)
- Dissertation for the Degree of Doctor of Philosophy.
- COMMONS, JOHN R. Proportional Representation. (*N. Y.: Crowell, 1896.*)
- COOLEY, HENRY S. A Study of Slavery in New Jersey. (*Studies in History and Politics, 1896.*)
- Dissertation for the Degree of Doctor of Philosophy.
- DEWEY, JOHN. The Influence of the High School upon Educational Methods. (*The School Review, January, 1896.*)
- Pedagogy as a University Discipline. (*University Record, Ann Arbor, 1896.*)
- EWING, J. R. History of British Policy. (*The Granville Times, June 25, 1896.*)
- FAY, E. A. An Inquiry concerning the Results of Marriages of the Deaf in America. (*American Annals of the Deaf, 1896-97.*)
- FISHER, JOHN A. Cardinals. (*Presbyterian Observer, Feb. 23, 1896.*)
- FLOOD, NED ARDEN. William McKinley and the Presidency. (*American Journal of Civics, April, 1896.*)
- FRIEDENWALD, HERBERT. The Continental Congress. (*Annual Report of the American Historical Assoc. for 1894. Washington, 1896.*)
- GOULD, E. R. L. The Economics of Improved Housing. (*The Yale Review, May, 1896.*)
- HALL, A. CLEVELAND. Fairhaven. (*The New England Magazine, March, 1896.*)
- HARTWELL, E. M. Bowditch's Law of Growth and What it Teaches. (*Proceedings of the American Assoc. for the Advancement of Physical Science.*)
- Report of the Director of Physical Training, Boston Public Schools. (*School Document, No. 4, 1896, Boston.*)
- HASKINS, CHARLES H. The Vatican Archives. (*The American Historical Review, Oct., 1896.*)
- HORGE, C. W. Windelband's Principle of Morality. (*The Philosophical Review, November, 1896.*)
- HAYNES, GEORGE H. Winsor's Mississippi Basin. (*Annals of the American Academy, Phila., 1896.*)
- A Chapter from the Local History of Know-nothingism. (*New England Magazine, September, 1896.*)
- HAYNES, JOHN. The Currency of the United States. (*The Congregationalist, Oct. 15, 1896.*)
- HERRIOTT, FRANK I. The Poor in Great Cities. (*Annals of the American Academy, Phila., 1896.*)
- HOLLANDER, J. H. Letters of David Ricardo to John Ramsay McCulloch. (*American Economic Association, Vol. X, No. 5-6.*)
- Reviews of Ilake and Wesslau's "The Coming Individualism;" of Bergmann's "Geschichte d. Nationalökonom. Krisentheorien;" of "Adam Smith and James Anderson." (*Annals of the American Academy, Phila., 1896.*)
- Report of the Ninth Annual Meeting of the American Economic Association. (*The Nation, January 7, 1897.*)
- HOWE, FREDERIC C. Taxation and Taxes in the U. S. under the Internal Revenue System, 1791-1895. (*N. Y.: Crowell, 1896.*)
- HULL, WILLIAM I. Summer Work among the New York Poor. (*Friends' Intelligencer and Journal, Sept., 1896.*)
- Some Neglected Factors in Temperance Reform. (*Read at Birmingham Monthly Meeting, Swarthmore, 1896.*)
- INGLE, E. Southern Sideights. (*N. Y.: Crowell, 1896.*)
- JAMES, JAMES A. Cornell College. (*Methodist General Conference Daily, Cleveland, 1896.*)
- JONES, FREDERICK R. History of Taxation in Connecticut (1636-1776). (*Studies in History and Politics, 1896.*)
- Dissertation for the Degree of Doctor of Philosophy.
- LANIER, C. D. Thomas Hughes and "Tom Brown." (*Review of Reviews, May, 1896.*)
- LEE, GUY CARLETON. War Time Presidents; Modern Political Campaigns; Fathers of the Republic; The German Empire; Bismarck and the German Empire. (*The Home Magazine, 1896.*)
- The Lawyer's Position in Society. (*The Green Bag, June, 1896.*)
- Articles on Contemporary Politics in the Carlisle (Pa.) Daily Leader, 1896.
- Land in Anglo-Saxon Times; Mandamus. (*Albany Law Journal, 1896.*)
- The English Parliament. (*The Legal Adviser, Jan., 1897.*)
- Braeton. A Study in Historical Jurisprudence. (*American Law Review, 1897.*)
- LYNES, G. B. Lawrence Memorial Association. (*Baltimore News, May 23, 1896.*)
- MARKVAND, A. Nassau and the Orange and the Blue. (*Princeton College Bulletin, 1895.*)
- MIKKELSEN, M. A. Educational Unity. (*The Outlook, July 25, 1896.*)
- MORAN, THOMAS F. How Minnesota became a State. (*Minn. Historical Society Collections, 1896.*)
- PERRIN, JOHN WILLIAM. Syllabus of a Course of six lectures on France in the Nineteenth Century. (*Phila., 1896.*)
- History of Compulsory Education in New England. (*Mealville, 1896.*)
- PETRIE, G. Teaching of American History. (*The Sevanee Review, May, 1896.*)
- Two Pedagogical Problems. (*Ib.*)
- RAMAGE, B. J. The Dissolution of the Solid South; Homicide in the Southern States; Modern Taxation. (*The Sevanee Review, 1896.*)
- RILEY, F. L. Colonial Origins of New England Senates. (*Studies in History and Politics.*)
- Dissertation for the Degree of Doctor of Philosophy.
- ROSS, E. A. Social Control. (*American Journal of Sociology, 1896.*)
- The Location of Industries. (*The Quarterly Journal of Economics, April, 1896.*)
- Honest Dollars. (*Chicago: Kerr, 1896.*)
- SEAGER, HENRY R. Review of Bruce's Economic History of Virginia in the Seventeenth Century. (*Annals of the American Academy, Phila., 1896.*)
- SHERWOOD, SIDNEY. An Alliance with England, the Basis of a Rational Foreign Policy. (*The Forum, March, 1896.*)
- Smart's Studies in Economics. (*Annals of the American Academy, Phila., 1896.*)
- SHINN, CHARLES H. The Story of the Mine as illustrated by the great Comstock Lode of Nevada. (*N. Y.: Appleton, 1896.*)
- SIKES, E. W. Baptist History in North Carolina; Education among the Hebrews. (*Biblical Recorder, April 8, 1896.*)
- Nathaniel Macon; Review of Bassett's Regulations of N. C. (*Charlotte Observer, May 3 and Oct. 15, 1896.*)
- The Celtic Church. (*Wake Forest Magazine, 1896.*)
- SMALL, A. W. Scholarship and Social Agitation. (*American Journal of Sociology, 1896.*)
- The State and Semi-Public Corporations. (*American Journal of Sociology, 1896.*)
- SMYTH, A. H. Bayard Taylor. (*American Men of Letters: Boston: Houghton, 1896.*)
- SPARKS, FRANCIS EDGAR. The Causes of the Maryland Revolution of 1689. (*Studies in History and Politics, 1896.*)
- Dissertation for the Degree of Doctor of Philosophy.
- STEINER, BERNARD C. The Genealogy of the Steiner Family. (*Baltimore, 1896.*)
- and S. H. RANCK. Replacements. (*The Library Journal, Sept., 1896.*)
- Andrew Hamilton and John Peter Zenger. (*Penn. Magazine of History, Oct., 1896.*)
- Rev. Thomas Bray and his American Libraries. (*The American Historical Review, Oct., 1896.*)
- Reviews of American Historical Literature in the *Jahresberichte der Geschichtswissenschaft.*
- THOMAS, THADDEUS P. The Issues of the Campaign. (*The Kalends, Balto., Nov., 1896.*)
- TOLMAN, W. H. Natural Science in a Literary Education. (*Popular Science Monthly, 1896.*)
- Half a Century of Improved Housing Effort by the N. Y. Association for Improving the Condition of the Poor. (*The Yale Review, Nov., 1896.*)
- TRENT, W. C. The Case of Josiah Philips. (*The American Historical Review, 1896.*)
- Mark Twain as an Historical Novelist. (*The Bookman, May, 1896.*)
- Mr. Payne's "Little Leaders." (*The Sevanee Review, May, 1896.*)
- Anthony Trollope. (*The Citizen, Phila., Nov., 1896.*)
- Theodore Roosevelt as a Historian. (*The Forum, July, 1896.*)
- Teaching the Spirit of Literature. (*Atlantic Monthly, Sept., 1896.*)
- TRINE, R. W. What all the World's A-seeking. (*Boston: Ellis, 1896.*)
- TURNER, FREDERICK J. H. P. Judson's Growth of the American Nation. (*The American Historical Review, April, 1896.*)
- The Problem of the West. (*Atlantic Monthly, Sept., 1896.*)
- The Rise and Fall of New France. (*The Chautauquan, 1896.*)
- VINCENT, J. M. (translator). Constitution of the Kingdom of Belgium, translated and supplied with an introduction and notes. (*Annals of American Academy, Phila., 1896.*)
- Review of Lightfoot's Historical Essays. (*Ib., March, 1896.*)
- WARNER, A. G. Something on Reformation. (*The Charities Review, Nov., 1895.*)
- WEEKS, STEPHEN B. English Methods of Teaching American History; List of American Summer Schools; List of American Learned and Educational Societies. (*Report of Commissioner of Education, 1894-95.*) (*Washington, 1896.*)
- Libraries and Literature in North Carolina in the Eighteenth Century. (*Washington, 1896.*)
- WILLOUGHBY, W. F. Industrial Communities. (*U. S. Department of Labor, 1896.*)
- Government Publications. (*Yale Review, August, 1896.*)
- WILLOUGHBY, WESTEL W. An Examination of the Nature of the State. (*N. Y.: Macmillan, 1896.*)
- WILSON, WOODROW. George Washington. (*N. Y.: Harper, 1897.*)
- Mere Literature and other Essays. (*Boston: Houghton, 1896.*)
- Princeton in the Nation's Service. (*The Forum, Dec., 1896.*)
- WOODBURN, J. A. The Tariff in Legislation. (*The Chautauquan, April, 1896.*)
- The Monroe Doctrine and Some of its Applications. (*Ib., February, 1896.*)
- New Edition of Alexander Johnston's American Orations. (*N. Y.: Putnam's, 1896.*)

PROCEEDINGS OF UNIVERSITY SOCIETIES.

Scientific Association.

See p. 11 of this Circular.

Philological Association.

October 16, 1896.—One hundred and fifty-second regular meeting. Professor Gildersleeve in the chair. Forty-two members were present. Custom and Myth in The Midsummer Night's Dream, by H. WOOD. Diodorus' Account of the Peloponnesian War, by E. L. GREEN. (See p. 18.)

November 20.—One hundred and fifty-third regular meeting. Professor Gildersleeve in the chair. Thirty-eight members were present. The Myth of the Eye-Ball in Vedic Literature, by M. BLOOMFIELD. The Cypress Grove of William Drummond of Hawthornden in its Relation to the Essays of Lord Bacon, by J. M. McBRAYDE, JR.

December 18.—One hundred and fifty-fourth regular meeting. Professor Gildersleeve in the chair. Thirty-two members were present. Goethe's Sonnets, by H. WOOD. Helitzsch's Assyrisches Handwörterbuch, by C. JOHNSTON, JR.

January 15, 1897.—One hundred and fifty-fifth regular meeting. Professor Gildersleeve in the chair. Twenty-nine members were present. Archinos, Orator and Reformer, by E. L. GREEN. The Latin Suffix -astro, by G. M. BOLLING. (See p. 18.)

A Scottish Wycliffe New Testament, by W. H. BROWNE. (See p. 18.)

Historical and Political Science Association.

October 9. The Regulators in North Carolina, by E. W. SIKES. (See p. 17.) Hubert's Histoire du Droit Criminel, by G. C. LEE. Francis Lieber's Political Philosophy, by E. A. SMITH. Summer Travel in Great Britain, by H. B. ADAMS.

October 23. Relations between Canada and the United States, by J. M. CALLAHAN. (See p. 17.) America's Contributions to Civilization, by C. H. BROUGH. Democracy and Education, by M. REIZENSTEIN. International Law and Arbitration, by P. L. KAYE. A Summer Meeting at Chester, England, by H. B. ADAMS.

November 6. Should History be taught Backwards? by J. M. CALLAHAN. Relations between Russia and England, by L. F. SCHMECKEBIER. Social Progress of the United States since the Revolution, by D. E. MOTLEY. The Problem of the West, by E. W. SIKES. Philip Freneau, by S. E. FORMAN. (See p. 17.)

November 20. Practical Value of Abstract Political Thinking, by W. W. WILLOUGHBY. Tassie's Medallion Portrait of Adam Smith, by H. B. ADAMS. New Methods of Historical Inquiry, by S. E. FORMAN. Channing's History of the United States, by G. W. WARD.

December 4. Colonial Court System of North Carolina, by E. W. SIKES. Influence of the College on American Life, by C. SNAVELY. The Civil Service in the United States, by C. W. SOMMERVILLE. Results of Woman Suffrage in Australia, by W. F. THOM. Value of Seminary Training to Lawyers, by H. B. ADAMS.

December 18. Changes in Church Organization in the Ninth Century, by G. C. LEE. (See p. 18.) Cuba, by J. M. VINCENT. The Speakership of the House, by J. C. BALLAGH. The Trent Affair, by J. M. CALLAHAN.

January 15. Industrial Communities in Europe, by W. F. WILLOUGHBY. Theory of the State, by E. W. KENNEDY. The Comstock Mine, by P. L. KAYE.

Physical Seminary.

Meetings, Saturdays 9-10.30 a. m. Papers and Demonstrations: The Hall Effect, by E. RHOADS. Electrical Waves, by J. S. AMES. The Beginnings of Physical Science, by J. S. AMES. Measurement of Surface Tension, by E. N. DORSEY. Measurement of Wave-Lengths, by J. S. AMES.

Naturalists' Field Club.

October 13, 1896.—Election of Officers. President, C. P. SIGERFOOS; Vice-President, B. W. BARTON; Secretary, C. E. WATERS; Chairman Zoological Section, F. S. CONANT; Chairman Botanical Section, J. E. HUMPHREY; Chairman Geological Section, R. M. BAGG.

November 10. The Holothurians of Port Arthur, by H. L. CLARK. Stagbeetles, by E. W. BERGER. Winter Eggs of Daphnids, by C. P. SIGERFOOS. Hybrid Ferns, by C. E. WATERS.

December 8. A List of Plants growing on Centre Street, by B. W. BARTON. Lueifer, by M. T. SUDLER.

January 20, 1897.—Special Meeting. Agassiz and Gurot, by President GILMAN. Agassiz, by Professor BROOKS.

Young Men's Christian Association.

Friday, October 30.—Address by Mr. ROBERT E. LEWIS, Traveling Secretary of the Student Volunteer Movement.

Tuesday, November 17.—Address by Rev. Dr. ELBERT S. TODD, observance of a day in the Week of Prayer for Young Men, and the Twelfth Anniversary of the Founding of the Association.

Tuesday, January 12.—Annual meeting, with reports of committees, and election of the following officers:—President, BERNARD C. STEINER; First Vice-President, M. L. BARR; Second Vice-President, J. A. KALB; Recording Secretary, JOSHUA LEVERING, JR.; Treasurer, C. K. EDMUNDS; Executive Council, the Officers, and Professor GRIFFIN, E. A. SMITH, S. S. KINGSBURY, T. G. MCFADDEN.

Thursday, January 28.—Address by Rev. GEORGE L. CURTIS, Day of Prayer for Colleges.

PUBLIC MEETINGS AND SOCIAL ASSEMBLIES.

Recently held in the University Buildings.

Reception by the Graduate Students' Association, in Levering Hall, December 2, in honor of Charles Dudley Warner, Esq.

Annual Meeting of the American Economic Association, in Levering Hall, December 28-31.

Annual Meeting of the Federation of Graduate Clubs of American Universities, in the Donovan Room, December 29, 30, with a reception on the evening of December 29.

Acknowledgments to the subscribers to the fund recently raised for the relief of the University, with a collation, in McCoy Hall, January 1, at 1 p. m.

UNDERGRADUATE EXAMINATIONS.

The following regulations were adopted by the Board of Collegiate Advisers, November 24, 1896:

I. Each instructor of an undergraduate class will hold an examination immediately before the Christmas holidays, and immediately before the Easter holidays. These examinations will be one or two hours in duration, as the instructor may choose. The ordinary lectures, recitations, and laboratory exercises will be suspended during the three days immediately preceding each of these holidays, and the examinations will, as far as possible, be brought within the days thus set apart.

II. Examinations occupying the ordinary recitation hour may be held at other times in the year, at the discretion of the instructor; but the number of hours of examination appointed by an instructor during the year (including the examinations at Christmas and at Easter) shall not be greater than the number of hours per week of his class instruction. Two hours additional may be assigned—one at Christmas and one at Easter—for examinations in the "Private Readings" of the language courses.

III. At the end of the year, the University will hold an examination of each class upon the work of the whole year. One session of three hours will be allotted to each full course, *i. e.*, to each course offering three or more hours of instruction per week, and a proportionate time to courses offering one or two hours of instruction.

UNIVERSITY SCHOLARSHIPS.

The Board of University Studies, at a meeting held January 12, awarded University Scholarships to the gentlemen named below:

C. ABBE, JR. (A. B., Harvard University). *Geology*.
G. A. DREW (S. B., Iowa State University). *Zoology*.
C. W. GREENE (A. B., Leland Stanford Jr. University). *Physiology*.
K. J. GRIMM (Tauberbischofsheim Gymnasium). *Semitic Languages*.
J. G. HARDY (A. B., Lafayette College). *Mathematics*.
G. P. KRAPP (A. B., Wittenberg College). *English*.
C. E. MENDENHALL (S. B., Rose Polytechnic Institute). *Physics*.
R. S. NORRIS (S. B., University of California). *Chemistry*.
P. OGDEN (A. B., Cornell University). *Romance Languages*.
D. A. PENICK (A. B., University of Texas). *Greek*.
M. REIZENSTEIN (A. B., Johns Hopkins University). *Economics*.
W. B. SAFFOLD (A. B., University of Alabama). *Latin*.

President GILMAN made an address on the "Responsibilities and Opportunities of Educated Men" in Calvary Protestant Episcopal Church, New York, before an assembly of students and college men, Sunday, January 10.

The Matteucci Medal of the Italian Society of Sciences has been awarded to Professor ROWLAND, in recognition of his work in spectrometry.

By vote of the Trustees, the exercises of Commencement will this year be held Tuesday, June 15.

OBITUARY.

MR. GEORGE C. STOKES, JR., died suddenly January 21, 1897, at his home near Baltimore, in the thirty-third year of his age. Mr. Stokes pursued a classical course in this University, and received the degree of Bachelor of Arts in June, 1884. In 1888 he graduated in the law department of the University of Maryland, and has since been engaged in the practice of law in Baltimore. He was the son of the Rev. George C. Stokes, of Baltimore county.

SPECIAL COURSES OF LECTURES.

1896-97.

By a vote of the Trustees, the courses of lectures below named* have been opened to persons not connected with the University. Further information, respecting hours, halls, and conditions of admission, may be expected from time to time.

The announcements are arranged in the order of time.

For convenience of reference, the lectures that have been given during this session, as well as those that are to come, are here mentioned.

*With the exception of one course.

I.

ARCHÆOLOGY.

(In connection with the Baltimore Society of the Archæological Institute of America.)

Professor DR. W. DÖRPFELD,

First Secretary of the Imperial German Archæological Institute in Athens,
two lectures, in *German*, at 4 p. m.

Wednesday, November 4. The Acropolis of Athens.

Saturday, November 7. Troy.

Both lectures were illustrated with lantern slides.

II.

MODERN PHILOSOPHY.

Professor EDWARD H. GRIFFIN, LL. D.,

six lectures discussing representative systems of modern thought from the point of view of Ethics and the Philosophy of Religion, in the Donovan Room, at 5 p. m.

Monday, November 16. Spinoza.

Wednesday, November 18. Hume.

Friday, November 20. Kant.

Monday, November 23. Hegel.

Wednesday, November 25. Spencer.

Monday, November 30. Summary of Results.

III.

ENGLISH STYLE.

(Before Students of the Modern Languages.)

JOSEPH JACOBS, Esq.,

President of the British Folk-Lore Society and Editor of "Folk-Lore,"
two lectures on English Style, in the Donovan Room, December 1 and 3,
at 4 p. m.

IV.

PROGRESS OF BOTANICAL SCIENCE.

Dr. JAMES ELLIS HUMPHREY,

Lecturer on Botany,

eight lectures on the history and present status of botanical science, with some account of the practical applications of the results of the scientific study of plants, in the Donovan Room, at 5 p. m.

Wednesday, December 2. The Development of Descriptive and Systematic Botany.

Friday, December 4. Herbaria and Botanic Gardens.

Monday, December 7. The Study of Plant Structure.

Wednesday, December 9. Plant Physiology and its Relations to our own Life.

Friday, December 11. The simpler Plants and their part in the Economy of Nature.

Monday, December 14.

The same (continued).

Wednesday, December 16.

The Relations of Plants to their Environment;
the Meaning of Structure.

Friday, December 18.

The Study of Life-histories and Relationships.

V.

FOUNDATIONS OF GEOMETRY.

(Before Students of Mathematics and Philosophy.)

MR. BERTRAND RUSSELL,

Fellow of Trinity College, Cambridge, England,

five lectures on the Foundations of Geometry, in the Physical Laboratory,
December 2-11, at 5 p. m.

VI.

PRINCIPLES OF COMMON LAW.

(Before Students of History and Politics.)

JAMES SCHOULER, LL. D.,

Professor of Law in Boston University,

twenty-five lectures, in the Donovan Room, on the Law of Personal Property, Mondays, Tuesdays, Wednesdays, and Thursdays, at 4 p. m., beginning January 5.

VII.

PROBLEMS IN MODERN MUNICIPAL LIFE.

(Before Students of History and Politics.)

ELGIN R. L. GOULD, PH. D.,

President of the City and Suburban Homes Company of New York,
seven lectures in the Donovan Room, Fridays, at 4 p. m., beginning January 8, on the following topics.

1. Popular Recreations. 2. Housing the Poor. 3. The Liquor Problem; Its rational treatment. 4. Care of the Unemployed. 5. The Church and the Masses. 6. Civic Reform and Social Progress. 7. University Settlements.

VIII.

SCIENCE OF GOVERNMENT.

(Before Students of History and Politics.)

WOODROW WILSON, PH. D., LL. D.

Professor of Jurisprudence, etc., in Princeton University,
twenty-five lectures on Some Fundamental Notions of Government, in the Donovan Room, daily (except Saturday) at 5 p. m., beginning Thursday, January 28.

IX.

MODERN FRENCH DRAMA.

FREDERICK M. WARREN, PH. D.,

Professor of Romance Languages in Adelbert College,

nine lectures on The Modern French Drama, in McCoy Hall, Mondays, Wednesdays, and Fridays, at 5 p. m., beginning Monday, February 1:

1. The Classical French Drama. 2. Voltaire's Innovations. 3. La Chaussée. Diderot. Beaumarchais. 4. Mercier. Shakspeare's Influence. 5. The Empire and Restoration. Cromwell. 6. The Historical Drama. Hugo and Dumas *père*. 7. Realism. Dumas *fils* and Augier. 8. The Minor Dramatists: Scribe, Sardou, Pailleron, Labiche. 9. The result of the conflict between the Classical, the Romantic, and the Realistic views of French drama.

X.

RELIGIOUS LIFE.

(Levering Lectures before the Young Men's Christian Association.)

Rev. LYMAN ABBOTT, D. D.,

three lectures in Levering Hall, at 5 p. m., Tuesday, March 16, Wednesday, March 17, Thursday, March 18.

Subject: "The Bible as Literature."

XI.

FRENCH POETRY.

(Percy Graeme Turnbull Memorial Foundation.)

M. FERDINAND BRUNETIÈRE,

Member of the French Academy; Editor of the "Revue des Deux Mondes,"
nine lectures (*in French*), in McCoy Hall, at 5 p. m.

- Thursday, March 25. La Poésie Épique du Moyen Age.
Friday, March 26. La Poésie Courtoise.
Monday, March 29. La Poésie chevaleresque: Romans de la Table ronde
et Amadis.
Tuesday, March 30. De Ronsard à Malherbe.
Thursday, April 1. La Poésie dramatique: Corneille, Racine, Molière.
Friday, April 2. De Voltaire à Chateaubriand.
Monday, April 5. La Poésie romantique.
Wednesday, April 7. Le combat du romantisme et du naturalisme dans la
poésie du 19^e siècle.
Friday, April 9. Le symbolisme et les tendances actuelles de la poésie.

As an introduction to the course of M. Brunetière, Mr. H. P. Thieme, a graduate student, offered three lectures on literary criticism in France since 1875, before students of the Romance Languages. The lectures were given January 4, 6, and 8, at 5 p. m.

Dr. F. Bonnette began, January 12, a series of readings from the writings of M. Brunetière, and will continue on Tuesdays and Thursdays, at 5 p. m.

XII.

PRINCIPLES OF GEOLOGY.

(Before Students of Geology.)

SIR ARCHIBALD GEIKIE, F. R. S.,

Director General of the Geological Survey of Great Britain and Ireland,
six lectures on the Principles of Geology, in the Geological Laboratory,
daily at 5 p. m., beginning Wednesday, April 21.

These lectures are strictly intended for geologists.

Sir Archibald Geikie will also give one public lecture during his stay in Baltimore.

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Ueber Collineationsgruppen an Kummer'schen Flächen. Von S. KANTOR.
Note on Linear Differential Equations with Constant Coefficients. By F. FRANKLIN.
On Certain Partial Differential Equations connected with the Theory of Surfaces. By THOMAS CRAIG.

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AMERICAN JOURNAL OF PHILOLOGY.

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CONTENTS.

	PAGE.
Proceedings of the Scientific Association, - - - - -	11-12
Notes from the Geological Laboratory, - - - - -	13-16
Abstracts of Papers, - - - - -	17-18
Professor Henry Newell Martin, - - - - -	19
Address of Professor Gildersleeve, January 1, 1897, - - - - -	20
Recent Publications in History and Politics, - - - - -	21
Proceedings of University Societies, - - - - -	22
Current Notes, - - - - -	22
Special Courses of Lectures, - - - - -	23-24
Recent Publications and Announcements, - - - - -	24

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